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The implementation of an integrated on-line health education system at RMIT

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Abstract

The Faculty of Biomedical and Health Sciences at RMIT has been developing an on-line health education system using a systems thinking approach, to create a learning environment whose basis is supported by Information Technology (IT). The centre-piece of this system is the Faculty Learning Centre, which has been created, both in space and layout, to promote collaborative learning between the students, so that the educator is physically assimilated with the student body. This facility is supplemented by the Faculty WWW server, which has been the main vehicle for course material dissemination to students. To ensure an effective on-line teaching environment, the position of an on-line facilitator has been created, whose responsibilities include both the continual evaluation of the system and the implementation of appropriate system changes. Aspects have included the production of a staff development training program and extensive user documentation. This paper discusses the systems thinking approach used to implement this integrated on-line system, and the establishment of explicit educational rationales in the use of IT to support learning strategies. Some examples of the on-line educational programs are also presented. © 1998 Elsevier Science Ireland Ltd. All rights reserved.

Keywords: Learning Centre; WWW; Collaborative learning; On-line education; Systems thinking

1. Introduction

The nature of the learning environment is undergoing a fundamental change, which can be supported, if not driven by the contemporary advances in Information Technology (IT). At present, we are in the initial stages of the development of on-line educational programs, and educational systems will remain in a period of transition for some time. Nonetheless, it is evident that on-line education offers the potential to advance beyond, both the 'many-to-many' interaction of 'face-to-face' education, as well as the time and place independence of conventional distance education [1]. In the longer-term, future edu-

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cation by on-line methodologies will be the norm, and teaching staff will have complete on-line teaching capabilities as part of their professional skills.

In response to these changes, the Faculty of Biomedical and Health Sciences at RMIT has been developing an on-line teaching environment for undergraduate students. The system has been designed to be both flexible and cost effective. It has been structured in an incremental manner, so that expansion, if appropriate, can occur as on-line teaching expertise is gained.

The core of the on-line learning environment is a Faculty Learning Centre that is entirely supported by IT. This resource services courses in applied biology, medical laboratory science and medical radiations science. In concert with this resource, the faculty operates a WWW server that is the front end for all Faculty Internet teaching activities. This server is used as the principal site for electronic lecture note dissemination and image storage.

The implementation of our integrated on-line health education system is presented here, the design of which has been based on a systems thinking approach [2] and the establishment of explicit educational rationales in the use of learning strategies using IT [3]. We also present some examples of our on-line educational programs.

2. Development and use of the Faculty WWW server

The Faculty of Biomedical and Health Sciences has developed its on-line educational program in an incremental and deliberately systematic manner by working to a four-stage model: conceive, create, evaluate and implement. This model is adapted from the concept of 'the learning wheel' [2], that has been popularised in system management thinking [4].

The development of any system begins with 'conceiving' an idea. The next stage involves 'creating' a tangible manifestation of that idea, a test model. This model is then studied and all feedback is 'evaluated'. A decision on how to 'implement' this feedback is then required. This consideration may require a re-think of the original concept. In following this model, each stage demands deliberate attention before any move is made to the next stage.

The initial outcome from the adoption of this flexible approach was the implementation of the Faculty www server, which has the additional capability of being a FTP server and learning material database. The WWW server fulfils the role of making available on-line the Faculty and Departmental home pages, course and subject material, lecture content, learning session support, course quality assurance (CQA) questionnaires, multi-choice questionnaires (MCQs), past exams and question and answer sheets. The end clients of this system–the students–are provided with accounts on this machine that provides them with a secure means of obtaining learning resources and providing feedback to the system.

In order to integrate on-line teaching into an existing program, in a way that value adds to the learning process, it was necessary to determine the student IT skill level and the status of the student home IT resources. A first year subject in one of our degree programs was used to trial this survey and it was found that 92% of the students in that subject have IT facilities at home suitable for full involvement in our on-line program. In response to these results, an educational program was developed to directionalise the learning experience for each student through the provision of learning resources in the

form of lectures and learning sessions. The familiarisation with Microsoft Word, Microsoft Excel, FTP and Netscape in the initial learning sessions was integrated into this program

3. Design of Faculty Learning Centre

The Faculty Learning Centre has been designed in a manner that is fundamentally different to what has characteristically been the case in higher education. Previously, on-line undergraduate education has occurred in 'computer laboratories', where a rather sterile and explicitly IT-based environment is used to deliver course materials, resulting in the isolated (student to computer) [1] interaction common in distance education. Research into the effectiveness of educational technologies demonstrates overwhelmingly that the application of such technologies does not in itself lead to an improvement in student learning [5]. Thus, the approach taken by the Faculty has been to structure a space with learning outcomes as the major priority, and the IT and structural demands introduced by an on-line learning environment, a secondary consideration [6].

3.1. Educational design factors

In creating the Faculty Learning Centre, staff aimed to provide an environment that conveyed a complete message of quality to the student. The system is geared toward developing a collaborative approach to learning both through the use of the technology itself, and in terms of the arrangement of student interactions, within the class group [7]. To ensure the safe use of this technology, a fully ergonomic environment was created, along with supporting information booklets advising on an effective and safe use of the resident technology. This ergonomic design of the Learning Centre has purposely been structured to facilitate collaboration between students in the use of the computer technology, and as a result, student work areas are generous. Furthermore, the room has been designed to promote the teacher as a learning facilitator rather than replicating the traditional teacher-directed classroom configuration, which has a tendency to reduce active group participation and interaction [1].

As part of the systematic approach to teaching and learning, a documentation manual has been created. This manual informs the Learning Centre users, both staff and students, on core aspects of the supporting technology and serves as a resource for the most frequently asked questions. By documenting the system in this way, introductory staff and student training overheads are minimised, and interested users may more readily contribute to the further evolution of the resource.

3.2. IT design factors

The performance of the supporting IT is central to the quality of the Learning Centre, as experienced by the users, therefore, the software and hardware are optimised for rapid response [6]. The Learning Centre has a dedicated high-speed Novell server, which services the 30 available computers, and associated high-resolution printers. The design of the networking infrastructure is such that each computer has its own dedicated 10 Megabits per second (Mbps) network connection to the Novell server, the two multimedia computers have dedicated 100 Mbps connections.

The on-line teaching software is contemporary, i.e. JAVA-based image processing software. The Faculty delivers most of the on-line materials from its WWW server.

Thus, students can access full course material, which includes lecture notes, MCQs (with answers and advice), and even past exams, at any time, from the Faculty Learning Centre or from home through an Internet Service Provider (ISP). The WWW server is also used as a vehicle for student feedback on subject evaluation, as part of the educational quality assurance process.

4. Staff development

The technology described above is of little use as a teaching resource unless there is associated staff development. As a result, the Faculty has placed significant emphasis on a parallel staff development program. To support students and staff during the transition to an increased level of on-line delivery, the faculty has created the academic position of an Online Facilitator. This role is filled by an academic staff member, who is able to use IT skills and current teaching experience at RMIT to structure on-line developments in a manner that best meets evolving staff and student requirements.

The staff development program runs over three workshop sessions. In the first session, educators are asked to identify and value core aspects of their current teaching practice to consider what type of changes they will make to their teaching when they implement an on-line program. The second session involves instruction in the effective use of the technology in the Learning Centre and on the Faculty WWW server. The final session builds on the current best-practice on-line teaching methodologies in the faculty and sets in place a staff mentoring system to promote a supportive introduction to the technology change for all interested staff.

5. The use of this system in current educational programs

The Faculty on-line health education system can be described in terms of the range of distribution technologies used and the breadth of teaching programs available. The areas of toxicology and radiologic imaging have been using the Learning Centre to deliver CDROM based material. The use of WWW browser software has enabled JAVA based image processing to be presented in radiologic imaging learning sessions, where the staff facilitators have collaborated with one other to ensure that the learning experience obtained by the students is more interactive than the experience provided in lectures. Pharmacology, Haematology, Immunology, Biochemistry and Pathology programs have all been presented on-line by the HYPERCARD authoring package. Lecture notes, question and answer sheets, CQA, MCQs and assignment materials are delivered by way of the WWW server to support educational programs in nuclear medicine, radiologic imaging, radiation therapy, medical laboratory science and in digital image processing [8]. A mini-PACS system has been used to support digital radiography, CT, MRI and DSA teaching in medical radiations science.

6. Conclusion

A systematic approach has been used to develop the on-line health education system at RMIT. Constant evaluation of the effectiveness of the Faculty WWW server as a learning resource has identified the need for an IT space, to facilitate the student learning experience. This space has been conceived as an educational space that promotes collaborative learning, with IT acting in a supportive

role. The creation of this environment has been deliberately labelled as the Faculty Learning Centre. Furthermore, the concept of appointing an experienced educator with a fundamental understanding of IT has resulted in the creation of the On-line facilitator position. The responsibility of this person has been to continually evaluate the system, implement desirable change and provide an educational basis to the IT support required, which has included the implementation of a staff development program and student training.

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